



# UNITED STATES PATENT AND TRADEMARK OFFICE

*lu*

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,306	04/20/2004	Shinsuke Fujiwara	4685	5680
21553 7590 11/28/2007 FASSE PATENT ATTORNEYS, P.A. P.O. BOX 726 HAMPDEN, ME 04444-0726			EXAMINER ARENA, ANDREW OWENS	
			ART UNIT 2811	PAPER NUMBER
			MAIL DATE 11/28/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/829,306

Applicant(s)

FUJIWARA ET AL.

Examiner

Andrew O. Arena

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1) ☒ Responsive to communication(s) filed on 23 August 2007.

2a) ☐ This action is FINAL.

2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4) ☒ Claim(s) 1-4, 12-15, 28, and 29 is/are pending in the application.

4a) Of the above claim(s) 2, 14 and 15 is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1, 3, 4, 12, 13, 28 and 29 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some \* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

  
LYNNE GURLEY

SUPERVISORY PATENT EXAMINER

Av 2811, TC 2800

## Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date May 18 2007.

4) ☐ Interview Summary (PTO-413)

Paper No(s)/Mail Date. \_\_\_\_\_

5) ☐ Notice of Informal Patent Application

6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. This application is eligible under 37 CFR 1.114 and the 37 CFR 1.17(e) fee has been timely paid, therefore, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/23/2007 has been entered.

### ***Election/Restrictions***

Claims 2, 14, and 15 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 06/24/2005 (Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, election treated as without traverse (MPEP § 818.03(a))).

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action (dated 01/26/2006).

Claims 1, 3, 4, 13, 28 and 29 are rejected under 35 U.S.C. 103(a) as being obvious in view of Fischer (US 6,265,734), Asryan (US 6,870,178) and Duggan (US 5,747,827).

**RE claim 1**, Fischer discloses a semiconductor light emitting device of II-VI group compound semiconductor (col 2 ln 35-40) formed on a compound semiconductor substrate (col 4 ln 56) and comprising an active layer (4; col 3 ln 49) between an n-type cladding layer (3; col 3 ln 48) and a p-type cladding layer (9; col 6 ln 40-44),

further comprising a first barrier layer (5; col 3 ln 49) consisting of a single layer of a ZnMgBeSe (col 6 ln 38-39) having a bandgap, provided between and respectively directly in contact with said active layer and said p-type cladding layer,

wherein said active layer has a stacked structure including a quantum well layer (col 3 ln 65) and a second barrier layer (inherent – a well in confined by a barrier), and

wherein said n-type cladding layer is formed of ZnMgSSe (col 6 ln 3 & 50-52).

Fischer differs from the claimed invention only in not expressly disclosing three specific properties of the first barrier layer: a single monolayer; i-type conductivity; and bandgap relationship to bandgap of p-type cladding layer.

Asryan discloses (Fig 8) a semiconductor light emitting device of a compound semiconductor comprising an i-type semiconductor barrier layer (116; col 4 ln 21) consisting of a single monolayer of an i-type semiconductor material (col 13 ln 39-42; Table II indicates only the cladding layers are doped) having a band gap larger than a band gap of a p-type cladding layer (Fig 8 and Table I in col 13), provided between an active layer (110) and a p-type cladding layer (122).

Duggan discloses a semiconductor light emitting device of a compound semiconductor, teaches II-VI and III-IV systems are art-equivalents suitable for blue LEDs and LDs (col 1 ln 12-13, col 4 ln 44-46 & 66, col 5 ln 1-2), and teaches (Fig 23) a

barrier layer (58) between and respectively directly in contact with an active layer (62) and a p-type cladding layer (64) in a II-VI-based light emitting device (col 11 ln 9-14).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that, in view of Asryan and Duggan, the first barrier layer of Fischer be a single monolayer of an i-type ZnMgBeSe having a band gap larger than a band gap of said p-type cladding layer; at least to use a known suitable material with predictable results. See MPEP § 2144.06-2144.07.

**RE claim 3**, Fischer as modified above differs from the claimed invention only in not expressly disclosing the magnitude of said band gap difference.

Asryan discloses (Table I, col 13) the claimed band gap difference.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that the magnitude of the band gap of said first barrier layer is larger by 0.05 eV than the band gap of said p-type cladding layer; at least use a known and suitable magnitude. See MPEP § 2144.06-2144.07.

**RE claim 4**, Fischer as modified above differs from the claimed invention only in not expressly disclosing the energy band diagram.

Asryan discloses (Fig 8) the claimed energy band relationships.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that in the band gap of said barrier layer, energy of valence band (808) is approximately the same as or higher than that (182 at 126 in layer 122) of said p-type cladding layer, and energy of conductive band (804) is larger than that (182

at 124 in layer 122) of said p-type cladding layer; at least to use a known and suitable energy band relationship.

**RE claim 13**, Fischer discloses an n-type (col 7 ln 3-7) ZnSe (col 2 ln 51-53) single crystal substrate is used as said compound semiconductor substrate.

**RE claim 28**, Fischer discloses said p-type cladding layer (9) is formed of ZnCdS (encompassed by col 6 ln 53-62 and col 2 ln 59-66).

**RE claim 29**, Fischer discloses said p-type cladding layer (9) is formed of ZnMgSSe (encompassed by col 6 ln 53-62 and col 2 ln 59-66).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer as modified for claim 1 above, and further in view of Domen (US 6,555,403).

**RE claim 12**, Fischer as modified above differs from the claimed invention only in not expressly disclosing thickness of said barrier layer.

Domen discloses a semiconductor light emitting device and teaches thickness of said barrier layer (col 53 ln 47-48, 56, 60, 63) is at least 5 nm and at most thickness of said active layer (col 52 ln 27-31).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made that thickness of said first barrier layer is at least 5 nm and at most equal to a thickness of said active layer; at least for known suitable thickness.

***Response to Arguments***

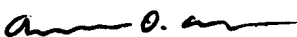
Applicant's arguments filed 08/23/2007 have been considered but they are moot in view of the new grounds or rejection.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew O. Arena whose telephone number is 571-272-5976. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571- 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Andrew O. Arena  
16 November 2007

  
LYNNE GURLEY  
SUPERVISORY PATENT EXAMINER  
AV2811, Te 2800